

AMENDMENTS TO THE DRAWINGS

The attached 4 sheets of drawings reflect changes to Figs. 7-8. These sheets replace the original sheets of these Figures. In Figs. 7-8, Applicant has been requested to include the phrase “Prior Art” and has complied with the Office Action’s request.

Attachments: 2 Replacement Sheets

2 Annotated Sheets Showing Changes

REMARKS

Reconsideration of the above-identified application in view of the foregoing amendments and following remarks is respectfully requested.

A. Amendment to the Specification

By this paper, the title is amended to "IMAGE SENSING APPARATUS AND METHOD FOR ACCURATE DARK CURRENT RECOVERY OF AN IMAGE SIGNAL." The amendment is believed to resolve the objection of the May 18, 2007 Office Action at page 2. Support for this amendment may be found throughout the instant specification including, for example, p. 1, lns. 5-10 and p. 6, lns. 6-12. No new matter has been introduced by this amendment. Applicant notes, however, that the title has been amended merely to enable the United States Patent and Trademark Office and the public to generally determine quickly from a cursory inspection the nature and gist of the technical disclosure and to aid indexing, classifying, and searching. 37 C.F.R. § 1.72(b); MPEP § 606.01. This amendment is *not* intended to narrow, limit, alter, or otherwise characterize what Applicant regards as the invention. It is, of course, the claims and not the title that defines the invention being claimed. Reconsideration and withdrawal of this objection to the specification are respectfully requested.

B. Claim Status / Explanation of Amendments

Claims 1-10 are pending and were rejected. As to the merits, claim 7 was rejected pursuant to 35 U.S.C. § 112, second paragraph as allegedly being indefinite. [5/18/07 Office Action, p. 2]. Claims 1-4, and 9-10 were rejected pursuant to 35 U.S.C. §103(a) as allegedly being unpatentable over Applicant's Admitted Prior Art ("AAPA") in view of U.S. Patent No. 5,355,164 to Shimoyama, et al. ("Shimoyama"). [5/18/07 Office Action, p. 2]. Claim 5 was

rejected pursuant to 35 U.S.C. §103(a) as allegedly being unpatentable over AAPA in view of Shimoyama and further in view of U.S. Patent No. 6,353,223 to Ookawa ("Ookawa"). [5/18/07 Office Action, p. 8]. Claims 6 and 8 were rejected pursuant to 35 U.S.C. §103(a) as allegedly being unpatentable over AAPA in view of Shimoyama and further in view of U.S. Patent No. 6,304,292 to Ide, et al. ("Ide"). [5/18/07 Office Action, p. 8]. Claim 7 was rejected pursuant to 35 U.S.C. §103(a) as allegedly being unpatentable over AAPA in view of Shimoyama and further in view of U.S. Patent No. 6,700,609 to Abe ("Abe"). [5/18/07 Office Action, p. 10].

By this paper, claims 1, 6-7, and 9 are amended. Claim 1 is amended to recite, *inter alia*, an image sensing element with a "plurality of pixels arrayed in horizontal and vertical directions." The pixel array of claim 1 further includes an "effective pixel area" which outputs a signal of an object in addition to first and second "reference pixel area[s]" which output first and second "reference signal[s] for DC signal recovery." Claim 1 is further amended to recite the limitation wherein a "pixel in the first reference pixel area is shielded from light and does not have a photoelectric conversion element" and a "pixel in the second reference pixel area is shielded from light and has a photoelectric conversion element." The "first [and] second correction device" of claim 1 are changed to a "first [and] second correction unit" which are "adapted to DC recovery signals of the effective pixel area" based on the first and second reference signal, respectively. Similar and conforming amendments are made to independent claim 9. Support for the changes to claim 1 and 9 can be found throughout the application as originally filed including, for example, p. 6, ln. 13 to p. 7, ln. 16 as well as Fig. 1 and accompanying descriptive text.

Claim 6 is amended to conform to the language of amended claim 1 such that a "second correction device" is changed to a "second correction unit" and the "predetermined pixel region"

is changed to the "effective pixel area." Claim 7 is amended to depend from claim 6 instead of claim 3 as affirmed by the Office Action. [5/18/07 Office Action, p. 2-3].

No new matter will be introduced into this application by entry of these amendments.
Entry is respectfully requested.

C. Rejection of Claim 7 under 35 U.S.C. § 112, Second Paragraph

Applicant respectfully traverses the rejection of claim 7 under 35 U.S.C. § 112, second paragraph as allegedly being indefinite. Claim 7 has been amended to depend from claim 6 instead of claim 3 to correct antecedent basis. Accordingly, reconsideration and withdrawal of the Section 112 rejection of claim 7 is respectfully requested.

D. Claims 1-4 and 9-10 are Patentable over AAPA in view of Shimoyama

Applicant respectfully traverses the rejection of claims 1-4 and 9-10. As set forth in detail below, AAPA and Shimoyama do not teach, disclose, or suggest each and every element of these claims. Accordingly, the Section 103 rejection is respectfully traversed.

Applicant's claim 1, as amended, recites:

1. An image sensing apparatus using an image sensing element which has a plurality of pixels arrayed in horizontal and vertical directions, wherein:

the image sensing element includes an effective pixel area which outputs signal of an object image, a first reference pixel area which outputs a first reference signal for DC signal recovery, and a second reference pixel area which outputs a second reference signal for DC signal recovery,

wherein a pixel in the first reference pixel area is shielded from light and does not have a photoelectric conversion element, and

wherein a pixel in the second reference pixel area is shielded from light and has a photoelectric conversion element and outputs a signal including dark current component generated in the photoelectric conversion element,

said image sensing apparatus comprising:

a first correction unit adapted to DC recovery signals of the effective pixel area based on the first reference signal with respect to each corresponding horizontal line; and

a second correction unit adapted to DC recovery signals of the effective pixel area while evenly subtracting a representative value based on the second reference signal from each signal of a plurality of horizontal lines of the effective pixel area.

As recognized and asserted by the Office Action, AAPA does not disclose a "first reference signal for DC recovery" and a "first correction device which DC-recovers the signal from the predetermined pixel region for each row" as recited in Applicant's pending claim 1. [5/18/07 Office Action, p. 3]. The Office Action attempts to remedy this deficiency through the introduction of Shimoyama which is directed to a method of correcting image signals read from a linear optical sensor. In one aspect, as shown in Fig. 5 below, Shimoyama discloses a method wherein the dark current value is determined by measuring the average read value of a plurality of blind pixels (BC) arrayed along both ends of a plurality of linear sensors. This average value is then subtracted from the image signal obtained from the read pixels to yield a corrected image. [Shimoyama, Col. 3, lns. 45-65].

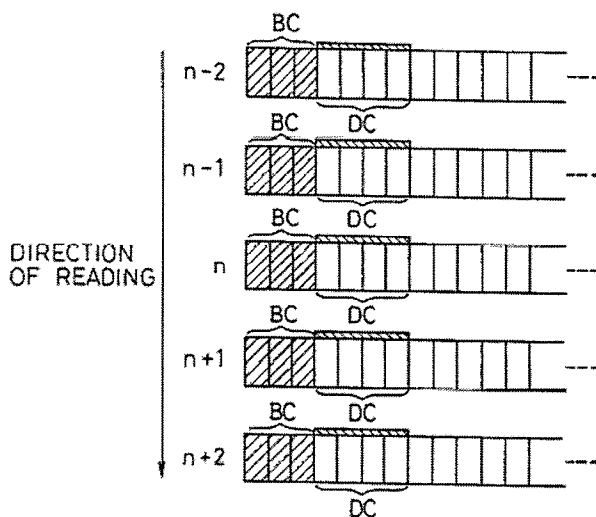


FIG. 5

The Office Action contends that Shimoyama's blind pixels (BC) correspond to Applicant's "first reference signal for DC recovery" and Shimoyama's process for image correction by dark current subtraction (as described above) corresponds to Applicant's "first correction device which DC-recovers the signal from the predetermined pixel region" as recited in pending claim 1. [5/18/07 Office Action, p. 4]. However, Applicant is directed to a correction method wherein DC recovery of the image is performed by initially subtracting the "first reference signal with respect to each corresponding horizontal line" and then subtracting a "representative value based on the second reference signal" as recited in amended claim 1. Thus, in performing dark current correction, Applicant initially uses the first reference signal to clamp the image signal from each horizontal line and then clamps the signal using a representative value from the second reference signal. Shimoyama, on the other hand, fails to disclose or even recognize the benefit of doing so.

Applicant respectfully asserts that it would not have been obvious to one of ordinary skill in the art at the time of the invention to modify either AAPA or Shimoyama to perform dark current recovery of an image signal from a photoelectric element using the disclosed two-stage subtraction process. A person of ordinary skill in the art would recognize the benefit of a single correction unit, but would fail to realize the ability to reproducibly create high-quality DC-recovered images by utilizing both correction methods. As such, Applicant respectfully asserts that this benefit is not taught by, nor is it obvious in light of AAPA and Shimoyama.

Accordingly, AAPA and Shimoyama - whether alone or in combination - fail to teach, disclose, or suggest DC recovery of an image signal utilizing the combination of a "first correction unit adapted to DC recovery signals of the effective pixel area based on the first reference signal with respect to each corresponding horizontal line" and a "second correction unit

adapted to DC recovery signals of the effective pixel area while evenly subtracting a representative value based on the second reference signal from each signal of a plurality of horizontal lines of the effective pixel area" as recited in Applicant's amended claim 1. Applicant submits claim 1 is patentably distinct from AAPA and Shimoyama for at least this reason. Independent claim 9 incorporates the same limitation, being directed to a "first [and] second correction unit" and, hence, is asserted to be patentably distinct for at least similar reasons. Since claims 2-4 and 10 depend either directly or indirectly from claims 1 and 9, respectively, they are all allowable for the same additional independent reasons set forth with respect to claims 1 and 9. Accordingly, the Section 103 rejection of claims 1-4 and 9-10 should be withdrawn.

E. Claims 5-8 are Patentable over AAPA in view of Shimoyama and further in view of the Cited References

Applicant respectfully traverses the rejection of claims 5-8 under 35 U.S.C. § 103(a) as allegedly being unpatentable for obviousness over AAPA in view of Shimoyama and further in view of Ookawa, Ide, or Abe. For at least similar reasons as stated above and for the tertiary references failing to overcome the deficiencies of the primary and secondary references, claims 5-8 are asserted to be patentably distinct. Accordingly, Applicant respectfully traverses the Section 103 rejection of claims 5-8 over AAPA in view of Shimoyama and further in view of Ookawa, Ide, or Abe. It is respectfully submitted that all of the pending claims are now allowable for the above reasons and early, favorable action in that regard is respectfully requested.

It is further respectfully noted that independent claims 1 and 9, as amended, are nonobvious over the cited tertiary references. For example, review of the art relied upon by the Office Action shows that each of Ookawa, Ide, and Abe fail to disclose an image sensing

apparatus wherein the image signal is clamped using a two-step process in which the first reference signal is initially used to clamp the image signal from each horizontal line with the second clamping process being performed using a representative value from the second reference signal. Accordingly, claims 1 and 9 are respectfully asserted to be patentably distinct from Ookawa, Ide, and Abe.

Applicant has chosen in the interest of expediting prosecution of this patent application to distinguish the cited documents from the pending claims as set forth above. These statements should not be regarded in any way as admissions that the cited documents are, in fact, prior art. Applicant has not specifically addressed the rejections of the dependent claims. Applicant respectfully submits that the independent claims, from which they depend, are in condition for allowance as set forth above. Accordingly, the dependent claims also are in condition for allowance. Applicant, however, reserves the right to address such rejections of the dependent claims in the future as appropriate.

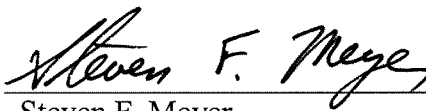
CONCLUSION

For the above-stated reasons, this application is respectfully asserted to be in condition for allowance. An early and favorable examination on the merits is earnestly solicited. In the event that a telephone conference would facilitate the examination of this application in any way, the Examiner is invited to contact the undersigned at the number provided.

THE COMMISSIONER IS HEREBY AUTHORIZED TO CHARGE ANY ADDITIONAL FEES WHICH MAY BE REQUIRED FOR THE TIMELY CONSIDERATION OF THIS AMENDMENT UNDER 37 C.F.R. §§ 1.16 AND 1.17, OR CREDIT ANY OVERPAYMENT TO DEPOSIT ACCOUNT NO. 13-4500, ORDER NO. 1232-5187.

Respectfully submitted,
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Dated: August 20, 2007

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